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| 30827 | 7590 | 09/09/2005 | EXAMINER | |
| MCKENNA LONG & ALDRIDGE LLP | | | CALEY, MICHAEL H | |
| 1900 K STREET, NW | | | ART UNIT | |
| WASHINGTON, DC 20006 | | | PAPER NUMBER | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/697,024

Applicant(s)

NAM ET AL.

Examiner

Michael H. Caley

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 1-4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Election/Restrictions

Claims 1-4 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 7/29/04.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 5-7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Dohjo et al. (U.S. Patent No. 5,835,177 "Dohjo").

Regarding claim 5, Dohjo discloses a manufacturing method of an array substrate comprising:

- forming a gate electrode (Figure 7 element 111) on a substrate having a display region (Figure 7, TFT region) and a non-display region (Figure 7, Scan line pad, Signal line pad);

- forming a gate insulating layer (Figure 8 elements 115 and 117) on the gate electrode;

- forming an active and an ohmic contact layer (Figure 8 element 119; Column 13 lines 28-31) on the gate insulating layer over the gate electrode;

- forming source (Figure 13 element 126a) and drain (Figure 13 element 126b) electrodes;

- forming a pixel electrode (Figure 13 element 131) contacting the drain electrode on the gate insulating layer;

- forming an alignment layer (Figure 2 element 141) on the pixel electrode and the source and drain electrodes;

- forming a data line (Figure 1 element 110) connected to the source electrode and having a data pad (Figure 13 element 111b) at the non-display region; and

- forming a data pad terminal (Figure 13 element 131) contacting the data pad.

Regarding claims 6 and 7, Dohjo discloses the data pad terminal and the pixel electrode as formed at the same time and of the same material (Column 14 lines 45-66).

Regarding claim 9, Dohjo discloses at least one of the electrodes as formed by a dry etching method (Column 14 lines 45-53).

Claim 18 is rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka et al. (U.S. Patent Application Publication No. 2001/0035527 "Tanaka").

Tanaka discloses a method of manufacturing an array substrate for a liquid crystal display device comprising:

forming a thin film transistor (Figure 3 element 200) having a gate electrode (Figure 5A element 201), source (Figure 11 element 213) and drain (Figure 11 element 214) electrodes, an active layer (Figure 10 element 104), and an ohmic contact layer (Figure 11 element 109);

forming a pixel electrode (Figures 10 and 11 element 209) contacting the drain electrode;

wherein the formation of at least one of the electrodes, the active layer, and the ohmic contact layer are processed by a photolithography method using photoresists; and wherein one of the photoresists used in the formation is removed by a dry strip method using dry gases (Page 4 [0070], [0074]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dohjo in view of Matsunaga et al. (U.S. Patent No. 5,510,918 "Matsunaga").

Dohjo fails to disclose the pad terminal as extending to the display region. Matsunaga, however, teaches a pad terminal less susceptible to corrosion by extending the pad terminal to the display region beneath a passivation layer (Figures 8 and 19 element DTM; Column 12 lines 19-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the pad terminal disclosed by Dohjo to extend to the display region. One would have been motivated to extend the pad terminal to the display region to keep the resistance of the data terminal from increasing due to corrosion (Column 12 lines 26-30).

Claims 10, 11, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dohjo in view of Tanaka.

Regarding claims 10 and 13, Dohjo fails to disclose one of the electrodes or ohmic contact layer as formed by a photolithography method using a photoresist. Tanaka, however, teaches a photolithography method using a photoresist to form at least one of the electrodes and

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the ohmic contact layer (Page 4 [0070], [0073], Page 5 [0075], [0080]) as part of a method of finely forming TFT and pixel electrode elements on a substrate (Page 1 [0004]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed at least one of the electrodes and the ohmic contact layer in the display device disclosed by Dohjo by a photolithography method using a photoresist. Tanaka teaches such a method as conventionally used to finely form display elements on the active matrix substrate (Page 1 [0004]). One would have been motivated to use such a technique to benefit from the ability to finely control the placement of the TFT elements at a high density according to conventional methods.

Regarding claims 11 and 14, Dohjo fails to disclose the photoresist used in the photolithography method as removed by a dry strip method (ashing). Tanaka, however, teaches such a photoresist removal method as beneficial to enable a reduction in the number of photolithography steps in forming the TFT electrodes and ohmic contact layer (Page 2 [0011]-[0013], Page 4 [0073], [0074], Page 6 [0086]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the photoresist by a dry strip method in the display device disclosed by Dohjo. One would have been motivated to apply such a method to reduce the number of photolithography steps (Page 2 [0011]-[0013]) and to configure the lateral dimensions of the layers such that impurities in the liquid crystal layer are prevented from entering the a-Si film (Page 6 [0086]).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dohjo in view of Tanaka and in further view of Okutani (U.S. Patent No. 5,135,608 "Okutani").

Dohjo as modified by Tanaka discloses the dry strip method as using dry gases, but fails to disclose the use of O₂ as a base gas and SF₆ or CF₄ as a reactive gas. Okutani, however, teaches a mixture of CF₄ and O₂ as an alternative dry gas to O₂ alone in a dry strip method (Column 5 lines 10-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used O₂ as a base gas and SF₆ or CF₄ as a reactive gas in the dry strip method. One would have been motivated to use such a dry gas mixture as an engineering expediency to achieve the expected results of such a mixture such as a particular photoresist removal rate.

Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dohjo in view of Tanaka and in further view of Nakamura et al. (U.S. Patent No. 6,621,537 "Nakamura").

Dohjo as modified by Tanaka fails to disclose the upper surface of the ohmic contact layer as etched to a depth between about 100 and about 700 Angstroms. Nakamura, however, teaches an etched ohmic contact film with a controllable thickness between 200 and 700 Angstroms (Column 8 lines 35-64).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the ohmic contact layer to have an etched thickness between 100 and 700 Angstroms and a thickness before etching of 400 and 1000 Angstroms. One would have been motivated to set the thickness before etching and the etched thickness as proposed to allow

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for controllability of the ohmic contact layer thickness according to a desired ON current for the TFT device (Column 8 lines 35-38).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dohjo in view of Choi (U.S. Patent No. 6,169,592).

Dohjo fails to disclose the alignment layer as formed by a printing method. Choi, however, teaches the alignment layer as formed by a printing method (Column 2 line 10 – Column 3 line 16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have constructed the alignment layer disclosed by Dohjo by means of a printing method. One would have been motivated to form the alignment layer by a printing method as taught by Choi to avoid the labor intensive processes of alternative alignment layer forming methods (Column 2 lines 13-15) while forming a display having satisfactory display characteristics (Column 2 lines 36-49).

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Okutani.

Tanaka discloses the dry strip method as using dry gases, but fails to disclose the use of O₂ as a base gas and SF₆ or CF₄ as a reactive gas. Okutani, however, teaches a mixture of CF₄ and O₂ as an alternative dry gas to O₂ alone in a dry strip method (Column 5 lines 10-15).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used O₂ as a base gas and SF₆ or CF₄ as a reactive gas in the dry strip method.

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One would have been motivated to use such a dry gas mixture as an engineering expediency to achieve the expected results of such a mixture such as a particular photoresist removal rate.

Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Nakamura.

Tanaka discloses the ohmic contact layer as formed after the above dry strip method but fails to disclose the upper surface of the ohmic contact layer as etched to a depth between about 100 and about 700 Angstroms and a thickness before etching of 400 and 1000 Angstroms. Nakamura, however, teaches an etched ohmic contact film with a controllable thickness between 200 and 700 Angstroms (Column 8 lines 35-64).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the ohmic contact layer to have an etched thickness between 100 and 700 Angstroms and a thickness before etching of 400 and 1000 Angstroms. One would have been motivated to set the thickness before etching and the etched thickness as proposed to allow for controllability of the ohmic contact layer thickness according to a desired ON current for the TFT device (Column 8 lines 35-38).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael H. Caley whose telephone number is (571) 272-2286. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael H. Caley

August 31, 2005

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mhc



DUNG T. NGUYEN
PRIMARY EXAMINER